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The OTEC Liaison

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3 MAJOR GOVERNMENT REPORTS ENCOURAGING TO OTEC

Scorecard: 2 For, 1 Neutral

* 1 CONGRESS'S OFFICE OF TECHNOLOGY ASSESSMENT REPORTS ON OTEC

One must bear in mind, when considering the recently-released Office of Technology Assessment (OTA) report on OTEC, that the purpose of the OTA (see article elsewhere in this issue) is to provide members of Congress with an unbiased view of technological subjects. Based on that purpose, together with its history, the OTA

However, the OTA report also states that *large appropriations, rapidly amounting to billions of dollars, could influence the program toward development of a working prototype plant as soon as possible. This is a high-risk approach. It could produce the most rapid demonstration of some technology, but it could also result in skipping essential long-term testing and environmental studies. It could also force a premature choice among several concepts and possible products in order to concen-*



major influence on the success of that venture, but at the same time it was a success. Many feel that such impetus toward obtaining freedom from petroleum dependence is far more worthwhile than having men on the moon, and therefore justifies concentration of effort and funds on the development of renewable energy sources.

The OTA report on OTEC surely cannot be viewed as encouraging. It apparently views the uncertainties and unknowns as a deterrent rather than as an incentive to find the answers. Another major observation is that it seems as if the OTA based its conclusions on the state-of-the-art at the time its study began—over two years ago. No mention is made of several technological advances since then, such as bio-fouling presenting less of a problem than initially anticipated, and heat-exchanger experimentation providing results showing efficiencies higher than expected. The report, for example, lists *technical problems including heat exchangers... the cold-water pipe... the working fluid... underwater transmission lines... platforms*, but (See OTA Report, continued on Page 3)

strives to present members of Congress with any and all viewpoints, making no recommendations. Thus the OTA's OTEC report does exactly that.

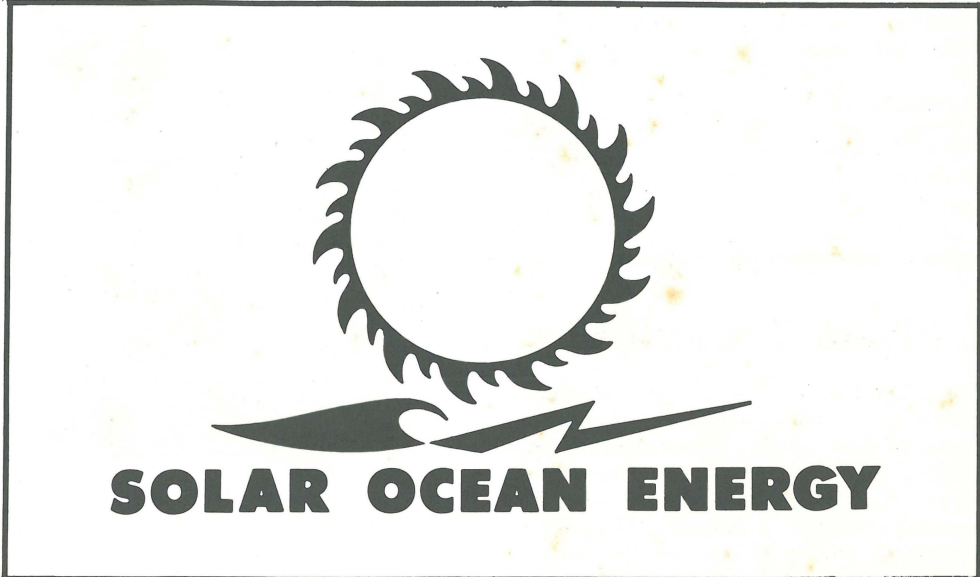
Requested by the Senate's National Ocean Policy Study almost two and a half years ago, the alternatives in the report were stated as ... *Congress should cease to fund a separate research program for OTEC, or it should continue to investigate the possibility of OTEC as an ultimately usable technology.* The report says the technology is *not yet developed* enough to make *acceptably precise estimates* of OTEC's technical feasibility, economics, or social and environmental impacts. It also states that, without government funding, private industry will not support the development of OTEC.

Regarding a demonstration plant, the OTA feels that some *essential and long-term testing and environmental studies* might be bypassed, causing *premature choices* between various concepts were such a plant pursued immediately. The report also states that *the future value of OTEC cannot be measured by simple economic projections* since a *renewable source of energy for the US could become a necessity, and alternative energy options will be critically needed.* Regarding funding, the report says *fairly level research and development money in the tens of millions of dollars for the next five to ten years could result in a program geared toward solving important technical problems.* This appears to be a recommendation to continue the extensive paper and other studies that have taken place in the last ten years.

trate on the development of one specific system.

Thus, the purpose of the OTA should be kept in mind: Show all the views; make no recommendations.

One surprising comment was that OTEC *probably could not become a viable part of the US energy supply system in this century.* This writer feels that this depends entirely on the degree of priority given this program. The race with Russia to the moon was shortened—and won—by the United States' high degree of motivation. Certainly excesses in money spent had a



The lack of awareness and understanding of OTEC among the general public spurred The OTEC Liaison to design a symbol that illustrates Solar Ocean Energy/OTEC. The reader's comments are invited. (See editorial on Page 2.)

The OTEC Liaison

AN INTERNATIONAL NEWSLETTER
ENGAGED AS LIAISON FOR THE
COMMUNITY OF OCEAN THERMAL
ENERGY CONVERSION

VOLUME 2, NUMBER 5
May 1978

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Please Subscribe!

The OTEC Liaison will provide continued liaison [from the French: *an instance or means of communication between bodies, groups, or units*] to the community of ocean thermal-energy conversion, with response to your expressed needs. Your comments and criticisms are welcomed,

Letter From The Publisher

GETTING THE WORD OUT

You, the leaders in the advancement and development of the OTEC program, are being asked to expend some of your time and energy in your already-busy schedules in "blowing your own horn"—promoting OTEC. In Sig Gronich's letter last September to The OTEC Liaison (see the September 1977 issue), he said: "As promising as OTEC appears for the long-term future—it may be the only solar option capable of competing economically for baseload electrical production—the technology is perhaps the least publicized of all solar concepts. Thus there is a need for information so that the American public can play an intelligent role in determining our national energy policy."

Several firms playing active OTEC roles are helping: See TRW's full-page ad reproduced in this issue, and note that Lockheed has produced a film, with another being prepared... but more must be done. Sun Day, on May 3rd, received enormous national publicity, but Solar Ocean Energy was not mentioned. This publication will now begin to use the terms OTEC and Solar Ocean Energy interchangeably—at least the latter says what it is and capitalizes on the press that solar energy is receiving. Much more must be done to improve knowledge and enthusiasm for the OTEC program—by blowing our own horn we will step up development and progress. As public awareness grows, added pressure will be brought to bear on the government agencies that set the pace for OTEC's advancement, as well as increase interest within private industry to increase its participation. How? Have your Public Relations Department contact me for concrete suggestions and co-operation in letting the public know what Solar Ocean Energy/OTEC is, where it is going, and what it can do for them.

There is currently, and there will continue to be, a great deal of publicity on solar energy. Those of us involved in OTEC can do the program a great deal of good by capitalizing on this new public awareness.

Cordially, Richard Arlen Meyer, Editor and Publisher

UNLIMITED POWER FROM THE OCEAN



To solve tomorrow's fuel crisis, research should have started yesterday.

At a company called TRW, it did.

Thanks to the Department of Energy, TRW has started the development of Ocean Thermal Energy Conversion (OTEC), one solution to the energy problem.

A typical OTEC platform uses solar-heated ocean water to generate 100 million watts of useful electricity hydrothermally, enough energy for a city of 100,000.

Each floating platform is 20 stories tall and has nearly 2.1 acres of deck, enough space to house an energy-intensive processing facility, such as an ammonia hydrolysis or aluminum reduction plant.

In fact, 150 OTECs—60 for aluminum and 90 for ammonia—will handle America's needs for these materials into the next century.

OTEC will also help conserve natural gas. Eight percent of the nation's gas is now used in the production of ammonia for fertilizer. An off-shore hydrolysis plant would free gas for critical mainland applications.

TRW began investigating the uses of OTEC in 1974, when it received one of the first federal grants given to an industrial firm for ocean thermal research.

TRW is now building the heat-exchanging evaporators and condensers which will be used in a 1MW test system in 1978. By 1985, the Department of Energy expects to demonstrate the full-scale 100 MWe plant.

If you'd like to learn more about OTEC, contact Robert H. Douglass, Manager of Energy Projects, TRW Systems Engineering and Integration Division, One Space Park, Redondo Beach, CA 90278 or call him at (213) 535-2446.

OCEAN THERMAL ENERGY

from a company called **TRW**

This is a reproduction of a full-page institutional advertisement run recently by TRW in full color.

does not summarize the recent research in these and other areas. The fact that the OTA suggests that OTEC designers are unable to cope with the questions regarding mooring difficulties and assembly of components at sea—while these are commonplace in the offshore oil industry—indicates the level of technical expertise of its authors.

The OTA report overall indicates that the US is able to move rapidly to an OTEC demonstration plant, but should not do so at this time, since all variations of OTEC concepts have not been checked out.

At any major airport one can view the many varied tail configurations of airplanes which all have similar economies, ranges, capabilities, safety characteristics, and the like. They all perform well, yet all are different in design. The same principle applies to everything from automobiles to sewing machines: There are many roads to the same destination. Any of the principal OTEC designs will work—and only by putting something in the water will we inevitably find not only many answers, but new questions as well.

(See the CRS report, also in this issue.)

*** 2 WHITE HOUSE PANEL SEES SUNNY FUTURE FOR SOLAR ENERGY**

In a report released in mid-April, President Carter's Council on Environmental Quality (CEQ) holds out far brighter hopes for solar energy than do most federal or private analysts. Solar energy could supply 25% of all US energy needs by the year 2000, and more than 50% by 2020, if the government backs it strongly now, the White House advisory group said. In contrast, the Department of Energy expects solar energy to account for at best about 10% of all US energy by the turn of the century.

The report, titled *Solar Energy—Progress and Promise*, says that it could say with assurance that solar energy is our best hope for the energy future. But CEQ member Gus Speth said Americans won't be sold on solar technology until the artificially controlled prices for competing fuels are raised. The report said: *In the past, consumers of oil, coal, and gas have been subsidized through systems of price controls and through unpaid environmental and national security costs.*

The CEQ cautioned that its prediction is based on conditions of accelerated development spurred by government support well beyond the programs planned at present. The report continues: *The prospects for solar energy are brighter than most imagine. The view of solar energy as a rather exotic energy source of little practical significance... is no longer justified.*

Sunlight is not subject to embargo, said Mr. Speth, adding that an energy-generating industry based on solar energy would

produce twice as many jobs as the same investment in coal or nuclear electric utility plants.

The White House council has decided to take a strong stand in support of solar energy because it fears that the current federal push for increased coal reliance will harm the environment.

*** 3 US CONGRESSIONAL RESEARCH SERVICE ASSESSES "ENERGY FROM THE OCEAN"**

In contrast with the OTA report (see article in this issue), which was generally neutral toward OTEC, the 433-page volume just released by the Congressional Research Service (CRS) of the US Congress is quite encouraging. Entitled *Energy from the Ocean*, the report covers each of the renewable forms of ocean energy, including offshore geothermal and deep-ocean oil and gas as well as ocean waves, currents,

CRITICS QUESTION OTA WORTH AS CONGRESSIONAL ADVISOR ON TECHNOLOGY POTENTIAL

The viability of the Federal Government's Office of Technology Assessment (OTA), established in 1972 to advise Congress on the potential effects of proposed technological changes, was examined last month by Mr. Arlen J. Large, a member of the *Wall Street Journal's* Washington Bureau.

Pointing out in the April 21st issue of the *Journal* that the main function of such Congressional advisory agencies is to provide information relevant to pending legislation, Mr. Large compares the shaky record of the OTA to the solid achievements of the Library of Congress's Congressional Research Service, and questions whether the OTA can be realistically expected to supply technological advice more effectively than the Library of Congress, which has far greater manpower and experience.

Mr. Large explains that although the Library of Congress has specialists in science and technology among its five hundred research experts, the Office of Technology Assessment was created in the hope that it would afford a valuable center of objective advice for sorting out controversial issues and warning of potentially dangerous side effects of new technology.

But the OTA's effective authority was vested primarily in a Congressional governing board of six Senators and six House members, many of whom have apparently sought to direct the agency's attention to their own special interests at the expense of what many critics consider more vital objectives.

Last year former Connecticut Representative Emilio Daddario, who was instrumental in founding the OTA and became the new organization's first director, abruptly resigned his position amid alleged

tides, and others.

Environmentally, the CRS asserts that renewable ocean energy is safe, although OTEC's impact is not completely understood. The report states that *environmental consequences relating to a cooling of ocean waters... could dictate an upper limit... at about the 10⁷ megawatt level*, but admits that this is just conjecture. Also cited is the fact that OTEC is operable the year round, 24 hours a day, and does not require storage systems or conventionally-powered backup systems.

In general, the report concludes that renewable ocean energy can only be economically utilized in limited areas where it is concentrated, such as in certain estuaries (tidal and salinity gradients), ocean-current localities, nearshore tropical and subtropical areas (OTEC), upwelling areas (bioconversion), and coastal areas with fairly large and regular waves. It assumes that renewable ocean energy will not soon become a significant source of world energy supply, but could be of major local importance in particularly favorable areas where the resource potential is significant or where conventional energy systems are not available or feasible. OTEC plants are capable of generating baseload electricity without large-scale storage capacities. Since OTEC plants have the potential to produce baseload electricity for existing grids, they are capable of displacing fossil-fueled and nuclear power plants, the two most common baseload electricity generators.

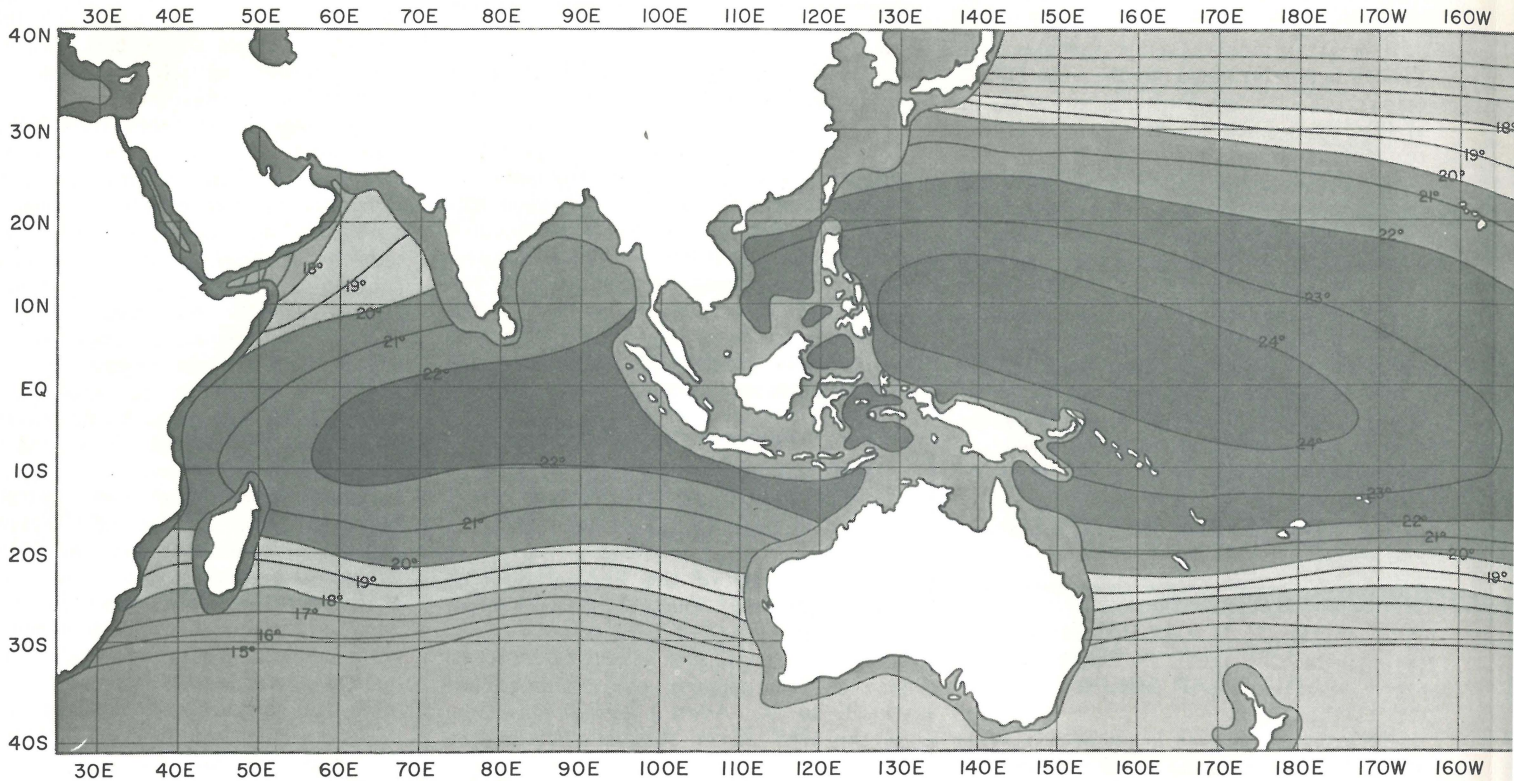
Aware of critics who view OTEC as a high-cost, high-risk, and uncertain energy option with perhaps a relatively small pay-off compared with other energy options... they question whether research and development will bring breakthroughs on costs and raise doubts about resource accessibility, energy transmission ashore, vulnerability to attack by nature or man, and environmental, legal, and political implications. But, concludes CRS, the issue is that the nation needs all the energy it can muster... Renewable energy options appear particularly attractive from the standpoint of serving in a supplementary role to nuclear and coal programs... OTEC could provide electricity to mainland distribution grids—even possibly providing baseload power to utilities and process industries or replacement electricity with incremental expansions of energy-intensive processes (that would) come to be located at sea or on island sites. Mainland electricity is thus freed for other consumption.

The most encouraging conclusion of the CRS report is that early calculations of both the initial capital cost and the cost per kilowatt imply a favorable economic future for OTEC technology.

Other renewable energy from the ocean is also discussed in the CRS report, but to a lesser degree than OTEC. If readers are interested, *The OTEC Liaison* will be glad to forward a summary on energy from waves, currents, tides, oceanic wind, salinity gradients, or bioconversion.

LARGE SCALE OTEC THERMAL

$\Delta T(^{\circ}\text{C})$ BETWEEN SURFACE



LEGEND

BLUE	— AVERAGE OF MONTHLY ΔT 's LESS THAN 18 $^{\circ}$ C
YELLOW	— AVERAGE OF MONTHLY ΔT 's MORE THAN 18 $^{\circ}$ C, LESS THAN 20 $^{\circ}$ C
ORANGE	— AVERAGE OF MONTHLY ΔT 's MORE THAN 20 $^{\circ}$ C, LESS THAN 22 $^{\circ}$ C
LT RED	— AVERAGE OF MONTHLY ΔT 's MORE THAN 22 $^{\circ}$ C, LESS THAN 24 $^{\circ}$ C
DEEP RED	— AVERAGE OF MONTHLY ΔT 's GREATER THAN 24 $^{\circ}$ C
GREEN	— WATER DEPTH LESS THAN 1000 METERS

SCALE AND ACCURACY

THIS GLOBAL SCALE CHART SHOWS THE GROSS RESOURCE AVAILABILITY AND DOES NOT ADEQUATELY PORTRAY FEATURES WHOSE SIZE IS LESS THAN 200 MILES. LOCAL VALUES ARE CONSIDERED ACCURATE TO LESS THAN 1 $^{\circ}$ C IN DENSE DATA AREAS, BUT MAY BE LESS PRECISE IN REGIONS OF LARGE HORIZONTAL GRADIENTS.

WHEREVER THE ORANGE AND RED AREAS ($\Delta T > 20^{\circ}\text{C}$) INTERSECT THE GREEN AREA (WATER DEPTH < 1000 METERS), THERE WILL BE SOME PORTION OF THE GREEN AREA IN WHICH A ΔT OF 20 $^{\circ}\text{C}$ EXISTS AT DEPTHS SHALLOWER THAN 1000 METERS.

METHOD

SEA SURFACE TEMPERATURES WERE ANALYZED MONTHLY ON SPACE SCALES CONSISTENT WITH DATA AVAILABILITY. MEAN TEMPERATURES AT 1000 METERS WERE ANALYZED ON SCALES OF 2 $1/2^{\circ}$ LAT BY 2 $1/2^{\circ}$ LONG IN AREAS WITH MORE DATA AND ON 5 $^{\circ}$ LAT SCALES IN AREAS WITH FEWER OBSERVATIONS. MONTHLY AVERAGE ΔT VALUES WERE DETERMINED AND AVERAGED FOR 12 MONTHS. SEPARATE VALUES WERE DETERMINED FOR A 1 $^{\circ}$ LAT RESOLUTION IN THE HAWAII, GULF OF MEXICO, FLORIDA AND PUERTO RICO AREAS.

WHITE HOUSE REVIEW SET ON SOLAR ENERGY

A White House review is underway to develop an Administration strategy for accelerating the implementation of solar-energy power systems. The review will be conducted by the Domestic Policy Council, the President's body for addressing major problems government-wide.

Both the Department of Energy and the Council on Environmental Quality suggested the need for the review to the White House. This action coincided with the issuance of a CEQ report in April on solar energy which estimated that the US could provide up to one-fourth of its energy requirements from solar energy by the year 2000. The report also stated that prospects for solar-energy development were brighter than had previously been determined.

It is expected that the Domestic Policy Council review will identify the actions needed to achieve the goals identified in the CEQ report.

VALUE ENGINEERING COMPANY TO PROVIDE OTEC ENGINEERING SERVICES

DOE has selected Value Engineering Company of Alexandria, Virginia for negotiation of a contract to provide ocean engineering services for the DOE Ocean Thermal-Energy Conversion (OTEC) program. The value of the one-year contract is expected to be \$1.5 million. Value Engineering will provide technical analyses, reviews, surveys, monitoring assistance, and other technical engineering and management support for OTEC.

VE was chosen from among ten firms which responded to a request for proposal issued in February. DOE-Chicago will administer the contract.

OTEC PATENT ISSUED

In *The New York Times* "patents" section on May 13th, an illustrated article appeared describing "a new ocean power plant... designed for the National Aeronautics and Space Administration to generate electricity by the temperature difference between sun-heated surface water and cold water from the depths".

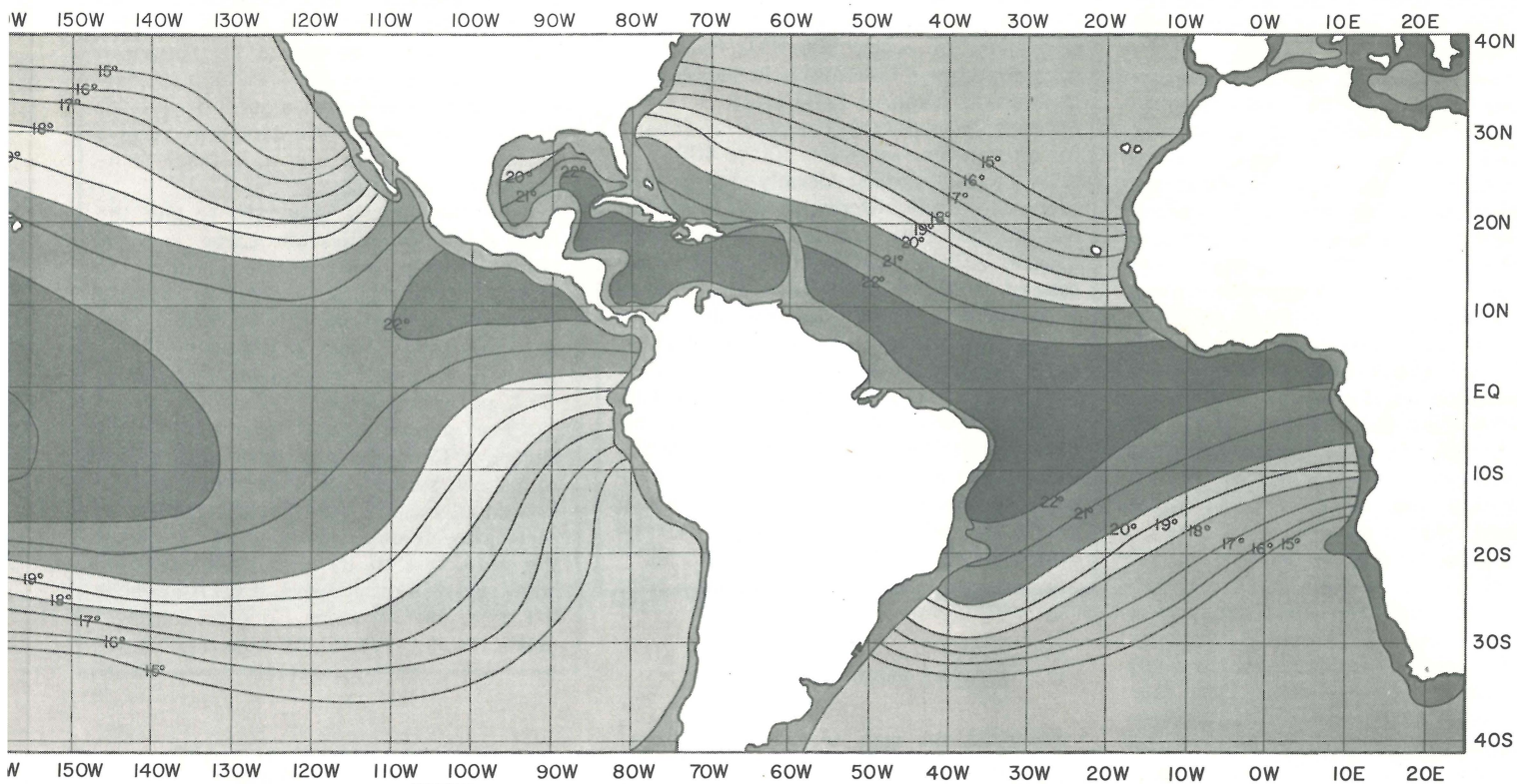
Patent 4,087,975 was granted to Lester J. Owens, a design engineer at the Kennedy Space Center in Florida. Copies of this patent are available from the US Patent Office in Washington. Also, most major-city and some university libraries have current patents on file.

WE NEED PHOTOS!

The OTEC Liaison requests readers to forward any and all photographs, sketches, or diagrams for publication. We wish to keep TOL lively and interesting, and we invite contributions toward that end.

DISTRIBUTION OF THERMAL RESOURCE

AT 1000 METER DEPTH



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Prepared by Ocean Data Systems, Inc.
Under contract number ET-78-C-01-2888
to Division of Solar Technology

For further information please contact
Division of Solar Technology (202) 376-4981



U.S. Department of Energy
Assistant Secretary Energy Technology
Division of Solar Technology

MICKEY MOUSE IN THE COLD-WATER PIPE ?

Yes, it's true: Mickey Mouse, Donald Duck, and their friends are now becoming heavily involved with solar ocean energy, since Walt Disney Productions is working on a film explaining OTEC principles to the public. While the man in the street can understand a windmill or a solar heating panel atop a house, he is understandably bewildered by the idea of being able to get electricity out of seawater. Even during the vast public exposure to solar energy during the May 3rd Sun Day promotion, absolutely nothing appeared in the press or on television about solar ocean energy or OTEC.

The Walt Disney film, forthcoming articles in *National Geographic* magazine, and a likely update on OTEC in *The Wall Street Journal*, all will add to the public's knowledge of OTEC. Also, the Editor of this publication is now preparing general articles for *Solar Age* and *Ocean Industry* magazines and also working with UNESCO

both on an article to be published in their monthly magazine, *The UNESCO Courier*, printed in 17 languages and distributed worldwide, and on a book on energy from the oceans.

READERS ARE ASKED TO HAVE THEIR PUBLIC-RELATIONS OFFICES CONTACT THE OTEC LIAISON FOR CO-OPERATION IN SPREADING THE WORD ON OCEAN THERMAL-ENERGY CONVERSION.

SATELLITE TO MONITOR OCEANS

In mid-May Lockheed Missiles and Space Company completed SEASAT A, the satellite which is designed to monitor the oceans. To be launched in June, the satellite will use microwave sensors to obtain information on surface winds, temperatures, currents, wave heights, ocean topography, and coastal storm activity. SEASAT A will circle the earth 14 times a day, surveying 95% of the global ocean.

OTEC DATA USER'S WORKSHOP HELD

Over 50 users of DOE's ocean thermal data acquisition and reporting program attended a workshop immediately following the Fifth OTEC Conference in Miami in February. The workshop, hosted by the Environmental and Resource Assessment Branch of DOE, was convened to critique the program. Attendees included both engineers who design and scientists who conduct environmental-impact assessments of ocean thermal components and systems.

You'd better be extra cautious if you're on the Washington scene or talking with government personnel, since there's a new acronym to be aware of. It's DOE-TEC, for the Department of Energy's Division of Transportation Energy Conservation. Sort of rhymes with OTEC—so keep your ears clean!

REMOTE FIELD INSTRUMENT MONITORS CORROSION

An instrument developed at the University of Miami's Rosenstiel School of Marine and Atmospheric Science is making it possible for land-based observers to monitor the corrosive effects of seawater on a metal alloy being tested on a 100-ton NOAA data buoy moored far out in the Gulf of Mexico.

The new instrument, a microprocessor-controlled remote corrosion-rate monitor, can measure the potential of a coupon of test metal immersed in seawater against a reference electrode. It then shifts the potential by a few millivolts and measures the current it takes to change it. The corrosion potential and the polarizing current values are stored in a communications microprocessor and transmitted by radio to shore during routine data-collection periods. The values transmitted from the field instrument and typed out on a computer at the NOAA Data Buoy Office at Bay St. Louis, Mississippi can be read to determine the rate at which the surface of the test metal is corroding, and the type of corrosion process that is at work.

An ocean-engineering student at the Rosenstiel School, William G. Dale, developed the monitor under the supervision of Dr. H. Lee Craig Jr., a materials specialist. "The monitor has applications anywhere in the marine environment," Dale said. "We are using it now in Dr. Craig's assessment of an aluminum alloy, 5052-0, for heat exchangers for OTEC power plants."

Craig's study is sponsored by the NOAA Data Buoy Office, which in co-operation with the US Department of Energy has equipped a discus buoy temporarily named "OTEC-2" with a hydraulic-flow system that pumps seawater from a depth of 75 feet through pipes of aluminum and titanium into heat-transfer monitor assemblies. These metals are being evaluated for use in full-scale OTEC plants.

While the field instrument is reporting changes in the aluminum aboard OTEC-2 to the computer at the NOAA Data Buoy Office at Bay St. Louis, Mississippi, Craig and Dale are conducting parallel tests with running seawater on the same aluminum alloy in Miami at the University's seawater test facility. "We started the control experiments one week before the field experiments began," Dr. Craig explained. "That way we can anticipate and validate what is happening on the buoy."

The computer print-out of corrosion data for the first week of operation of the remote corrosion-rate monitor (mid-April) has been received in Lee Craig's laboratory. The experiment will run for 19 more weeks. Sample rings of the aluminum pipe materials being observed with the field instrument will be collected from the NOAA buoy periodically and sent to Craig for analysis to determine which corrosion products are present. But the big question for power-plant efficiency (How fast do they form?) will already have been answered by the corrosion-rate monitor.

Page 6

HEAT-EXCHANGER TESTS: GOOD NEWS FOR OTEC

Two ocean thermal energy conversion (OTEC) heat exchangers have achieved heat-transfer rates that surpass the state-of-the-art by factors of two to three. A pool boiler unit designed by Union Carbide produced an overall heat-transfer coefficient of nearly 800 BTU/hour/foot squared/degrees Fahrenheit in recent tests at Argonne National Laboratory. The goal for that unit was 600. The state-of-the-art for smooth tube units was 300 to 400.

A second vertical doubly-fluted tube evaporator unit, designed by Carnegie-Mellon University and tested at Argonne, showed a heat-transfer coefficient in excess of 1,000. Further tests are planned to confirm this high performance.

The two heat exchangers represent good news for OTEC not only because of their high heat-transfer rates, but also because of their power density. Reducing the volume of heat exchangers—while maintaining or even increasing their performance—will also reduce their cost. Right now heat exchangers account for 50% of the total cost of OTEC systems.

ODECO BIDS FOR OTEC-1

One of the four teams of firms currently bidding for the role of System Integration Contractor (SIC) for the OTEC-1 Test Platform is an experienced offshore oil firm, Offshore Drilling and Exploration Company (ODECO). Working with Gibbs and Cox and the Stanwick Corporation, this team and the three others (see the March issue of *The OTEC Liaison*) are making oral presentations to the Department of Energy in May. Stanwick is a management-type firm strong in legislative support which provides management plans for various government activities both in the US and abroad.

An ODECO representative recently told *The OTEC Liaison* that their firm was generally not familiar with government business contracts and was "a bit afraid of it". They have also been approached by several companies wishing to bid with them on the 10MWe plant. ODECO's interest in OTEC has grown increasingly recently—not only in getting a rig to work, but in the entire OTEC program. Since all private capital has gone into offshore drilling, firms experienced in that field are cautious in considering involvement with federal programs, since they are not used to having "someone looking over their shoulder". But they feel their experience in working in the oceans could aid the OTEC program tremendously. The ODECO spokesman said that if they had an RFP spelling out exactly what the government wanted, "we'd be out there pumping water now".

(Critics, continued from Page 3)

backbiting among the staff and concern over whether Congress was really paying attention to OTA recommendations. The resultant shakeup produced a new director, Russell Peterson, who has apparently been given a freer hand in running the show.

"If we keep the politics out of it," asserts Peterson, "this organization can be a potent force." But former director Daddario, now chairman of the American Association for the Advancement of Science, claims it will take a good decade for the OTA to develop the capability to give Congress real insight into long-range technological problems.

However long it may take to give the OTA a fair trial, says Mr. Large, at some point Congress must decide whether the organization's advice is exerting positive impact on legislation. ("If we don't have any influence," says a member of the agency's own staff, "we ought to hang up OTA and terminate it.")

"For several years," Mr. Large concludes, "Congress has been threatening to pass a 'sunset' law that would abolish Executive Branch agencies that don't do their jobs. It ought to be ready to apply the same test to its own advice bureaucracy. On the other hand, if OTA's coaching starts making sense, Congress ought to listen, for it needs all the help it can get."

CHINA AND US INITIATE OCEANOGRAPHIC COMMUNICATION

In late April a twelve-member team of Chinese scientists visited many US oceanographic institutions under the sponsorship of the National Academy of Science and the American Council of Learned Societies. Headed by Lo Yu-ju, deputy director of the National Bureau of Oceanography (similar to the US National Oceanic and Atmospheric Administration), the group toured NOAA's Washington headquarters, Scripps, Woods Hole, and several universities. A group of US oceanographers will visit China later this year under a reciprocal agreement arranged by the Committee of Scholarly Communication with the People's Republic of China.

CONTRIBUTIONS INVITED

To add to *The OTEC Liaison's* function as an informative and useful instrument of communication, the editor invites readers to contribute. Contributions may take the form of informally-written reviews of research underway or planned, letters to the editor, or collect telephone calls. Inquiries of any sort are also invited, as we are generally well informed of OTEC progress as well as projected planning by researchers, government and private industry.

► The Sixth Annual OTEC Conference will be held in Washington DC, probably in January of 1979. It is expected to be hosted by George Washington University. There is talk of holding a separate meeting immediately after the DOE-sponsored conference, which will not be bound by restrictions encountered in the past.

► Two football-shaped "hot spots" have been located in the Pacific Ocean during the last year, each about 2,000 miles long and 1200 miles wide. Each has water three to five degrees warmer than normal. Drs. Elmer Reiter of Colorado State University, William Quinn of Oregon State University, and Jerome Namias of the University of California's Scripps Institute of Oceanography are studying the mysterious hot spots.

► With the confirmation of Energy Secretary Robert Thorne, who is known to favor decentralization, it is likely that the OTEC branch of the Ocean Systems Branch of the Department of Energy will move to either San Francisco, Chicago, or Denver, in order of probability.

► Two articles on OTEC that might be of interest to readers are Francis LaQue's "OTEC Component Materials Typical for Survival at Sea", which appeared in the February issue of *Sea Technology*, and a front-page article entitled "Solar Ocean Power: Coming Soon?" in *The San Francisco Bay Guardian* February 10th.

► The United Nations monthly magazine *The UNESCO Courier* will soon carry an article on OTEC designed for the lay reader and authored by the editor of *The OTEC Liaison*. The magazine is printed in seventeen languages. UNESCO is also considering a book covering *ocean energy*.

► A Canadian firm is investigating an OTEC-type power plant in the Arctic, using the great delta-T between ocean waters and surrounding air. A paper presenting this concept was denied inclusion in the Fifth OTEC Conference held in Miami in February.

► Some electricity-generating solar cells contain toxic chemicals that might escape. Devices using sunpower to super-heat oil products to generate energy release benzene, a known carcinogen.

► An OTEC association and/or an OTEC Council is currently being considered for early formation to present a unified OTEC program to industry, government, and the public. Readers interested please contact *The OTEC Liaison*.

► The government of Guam is investigating the possibility of an OTEC plant on that ideally-suited island. A Japanese firm has prepared feasibility studies.

► A news release regarding the offshore oil industry's entry into the OTEC field, together with a news packet about OTEC, was distributed by *The OTEC Liaison* to press representatives who attended the recent Offshore Technology Conference in Houston.

► The Biofouling and Corrosion Studies have left Battelle Northwest Laboratories and are now located at Argonne National Laboratories in Argonne, Illinois.

► Dow Chemical's research on carbonate scale has initially come up with higher rates of scaling on both aluminum and titanium tubes than anticipated.

► Non-renewable energy sources now receive approximately 95% of the federal energy research budget.

► James Madewell is now Special Assistant to the Department of Energy's Bennett Miller.

► Energy Secretary Robert Thorne was confirmed by the US Congress May 18th.

► Dr. Abraham Lavi will leave the Department of Energy in July.

► The June issue of *Solar Age* is entitled *Electricity from the Sun*. An article on the current status of OTEC in this issue is authored by the editor of *The OTEC Liaison*.

US GOVERNMENT PROCUREMENT INVITATIONS AND CONTRACT AWARDS

Listed below are procurement invitations and contract awards related to OTEC in particular and ocean resources in general culled from the *Commerce Business Daily*. This is not to be construed, however, as a complete list.

May 1: Production Lot Acceptance, First Article, and Engineering Testing of Sonobuoys: Three-month extension of current contract. Services performed at Naval Industrial Reserve Plant, South Bristol ME, and Sonobuoy QA Facility, St. Croix VI. Tracor Marine Ocean Technology Division, Port Everglades FL, current contractor. Naval Avionics Facility, 21st St. and Arlington Ave., Indianapolis IN.

May 2: Marine Architectural Services in Support of Specific Programs Associated With the General Mission of the NOAA Data Buoy Program: Contract 03-78-G03-0502 (NDB8-1003), for \$128,650, to Gibbs and Cox Inc., 40 Rector St., New York NY 10006. NOAA Data Buoy Office, National Space Technology Laboratories, NSTL Station, MS 39529.

May 3: Research on Self-Mooring Feasibility: Contract N00014-78-C-0300, 18 Apr 78 (no RFP), for \$80,209, to Ocean Electronic Applications Inc., 245 Ridge-wood Road, Key Biscayne FL 33149.

May 4: Identify Issues and Concepts in Support of the DOE National Power Grid Study: Negotiations are being conducted with Mr. Abraham Braitman, Bethesda MD 20014. PO EB-78-X-01-3795, Attn: M. Lucas.

May 4: Assess the Feasibility of Developing a System for Tracking the Energy Impacts of Environmental Regulations on Major Energy-Producing Facilities: Negotiations are being conducted with American Management Systems Inc., Rosslyn VA 22209. PO EJ-78-X-01-2977, Attn: M. Lucas.

May 4: Energy, Employment, and Materials Impact of Policy Options: Contract ET-78-S-02-4743.A000, for \$50,000, to University of Illinois, Grants and Contracts Office, Office of Business Affairs, Urbana IL 61801.

● **May 4: Investigation of the Technical and Economical Feasibility of Novel Concepts for Transmission of Electric Power** so as to provide additional efficient, reliable low-cost and environmentally acceptable options for future national needs: Concepts to be investigated will include those which are considered promising but have not yet received detailed R&D attention. All requests to RFP ET-78-R-01-2887 should be in writing. No telephone requests will be honored. Department of Energy Office of Procurement Operations, Washington DC 20545, Attn: Document Control Specialist.

May 4: Program Definition and Development to Support International Commercialization of Solar Applications: Negotiations are being conducted with Energy Systems International, Washington DC 20013. Contract EM 78-C-01-4250. Attn: C. Kawalkien.

May 5: Digital and Contoured Data Fields of Relative Sea Surface Temperature and Estimates of Absolute Sea Surface Temperature from NOAA Source Satellites to NOAA's National Marine Fisheries, La Jolla CA: Negotiations are being conducted on a sole-source basis with Inter-American Tropical Tuna Commission, La Jolla CA. RFP NASO-8-207. NOAA, Northwest Administrative Service Office, 1700 West-lake Ave. North, Seattle WA 98109.

May 8: Additional Technical Support Concerning the Tactical Airborne Ocean Surveillance (TAOS) Study: Negotiations are to be conducted with Grumman Aerospace Corporation, Bethpage NY 11714.

May 15: Implementation of a DOE Solar Technology Transfer Delivery System: Contract EM-78-C-01-4213 (Un-solicited Proposal), for \$384,115, awarded to SBA/IBS, Inc., Washington DC 20417.